# Research report

# Population study of the North Island Robin (*Petroica australis longipes)* in the Waitakere ranges in New Zealand

Masha Leenen

# Population study of the North Island Robin (*Petroica australis longipes)* in the Waitakere ranges in New Zealand

*- A report of the methods and materials used*
*to monitor the reintroduced*
*North Island Robin population*
*in the Waitakere Ranges Regional Park*
*including a comparison of previous breeding seasons and a*
*discussion of current conservation activities –*

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# Summary

New Zealand, notable for its geographic isolation, developed a distinctive fauna dominated by bird species. Human settlement (approximately 1000 years ago) brought the first alien mammal predator species to this remote Island. In addition, invasive pests and weeds were introduced, threatening New Zealand's endemic flora and fauna. A rising awareness of the past and possible future extinction of endemic bird species, increased the support for conservation programmes to manage and remove animal pests as a measure to save New Zealand's species and ecosystems.

One of these conservation programmes is called Ark in the Park (AIP). Approximately 1100 hectares of the Waitakere Ranges Regional Park, to the west of Auckland, are predator and weed controlled. The main goal of this project, which started in 2003, is to enable endemic bird and plant species to return to and remain in their natural habitat. After one year of predator control, the first translocation of endemic bird species into the Waitakere Ranges started. In total, three endemic bird species, Whiteheads, North Island Robins and Stitchbirds have been translocated to the Ark in the Park since then [Ark in the Park 2008]

The crucial thing for reintroduced threatened species is to eliminate or control the factors responsible for their disappearance. Intensive monitoring of the reintroduced species therefore is crucial to see whether these factors have been eliminated and to get a general insight into possible problems a regenerating area is still struggling with.

The target species of this research, the North Island Robin, *Petroica australis longipes* (*Toutouwai*), a small (18 cm, 35 g) insectivorous forest passerine of the Australasian flycatcher family (*Petroicidae*), was reintroduction into the AIP area in 2005. With the discovering of breeding pairs, nests were monitored and chicks were banded. Throughout the research period of five months, new North Island Robin territories were searched and unbanded birds were caught and banded. Using these methods, 5 breeding pairs were found, the same number as in breeding season 2005/2006 and 2006/2007. In breeding season 2007/2008 in total eight breeding pairs were found. The extreme dryness of the area in which two of these eight pairs were breeding, and which occurred at the end of the previous breeding season explains why these pairs have left their territory. Additionally cat sightings have increased, also in the area (Whatitiri track [L3; L5.5]) where two of these breeding pairs were found. Moreover, the number of male North Island Robins has been decreasing drastically. Two male individuals (G-GM and YM-) that where breeding in the previous breeding season have disappeared. Of these pairs only the single females (GM-R and R-GM) remained in their territory and could have been monitored in the current breeding season. One additional male (BY-OM) disappeared while having its third clutch. The loss of these males can not be explained with certainty. In comparison to previous breeding seasons the average number of chicks per female is, with 3.3, the lowest number since the reintroduction. This can be explained by the low number of females who actually where productive. This breeding season only four females where actually producing offspring. One of these females died after her first clutch, assumed to be attacked by a cat, which was caught twice in this area, another female had one successful and two failed nests before she left her male and had one more nest with her 'old' male from previous breeding seasons. This also explains the low total number of chicks.

To improve the research methods, more than one person should be used to find North Island Robins ins the 1100 hectares area, thereby decreasing the likeliness of birds being undetected. The missing boundaries between the AIP area and the remaining, non predator controlled part of the Waitakere Ranges is an additional factor, influencing the number of birds found. A main conclusion about the success of the reintroduced North island Robin population in the predator controlled area of AIP therefore can not be made. Many individuals may not have been detected due to their dispersal throughout the whole Waitakere Ranges Regional Park and its surrounding. The study area is generally suitable to function as open sanctuary. The regenerating forest provides numerous suitable territories for the study species. Nevertheless should dogs be excluded from the area, which are a threat to reintroduced bird species that have not had the time to adapt to the danger of mammal predator species. In addition to the current predator control, cat traps on the edged of the AIP area are needed and strongly recommended.

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# Introduction

New Zealand, notable for its geographic isolation, developed a distinctive fauna dominated by bird species. Human settlement (approximately 1000 years ago) brought the first alien mammal predator species to this remote Island. In addition, invasive pests and weeds were introduced, threatening New Zealand's endemic flora and fauna. Especially the introduction of the Pacific rat (*kiore/ Rattus exulans*) and the possum (*Trichosurus vulpecula*) caused major problems and changed New Zealand significantly. Animal pests, such as wasps, ferrets, pets, possums, rats, stoats and weasels are a major threat to New Zealand's special endemic species as well as ecosystems and conservation lands [Department of Conservation]. A rising awareness of the past and possible future extinction of endemic bird species, increased the support for conservation programmes to manage and remove animal pests as a measure to save New Zealand's species and ecosystems.

One of these conservation programmes is called Ark in the Park. Approximately 1100 hectares of the Waitakere Ranges Regional Park, to the west of Auckland, are predator and weed controlled. The main goal of this project, which started in 2003, is to enable endemic bird and plant species to return to and remain in their natural habitat. After one year of predator control, the first translocation of endemic bird species into the Waitakere Ranges started. In total, three endemic bird species, Whiteheads, North Island Robins and Stitchbirds have been translocated to the Ark in the Park since then [Ark in the Park 2008].

The crucial thing for reintroduced threatened species is to eliminate or control the factors responsible for their disappearance [Veitch 1994; Hodder & Bullock 1997; World Conservation Union 1998]. This can sometimes be attributable to one event, such as the introduction of an exotic predator [Bell 1978]. However, the loss of a species in a particular region can also be the result of several factors. A reintroduction therefore may fail, overlooking the key threatening factor. Besides, the habitat may develop in a different way than wanted or is not ready yet, due to habitat fragmentation or missing maturity [Armstrong & Ewen 2001]. Considering these uncertainties, monitoring reintroduced populations is essential to assess the effects of conservation management, particular predator control, and get insight into the population viability [Armstrong et al. 2002].
Thus, with the reintroduction of 53 North Island Robins to the Waitakere Ranges Regional Park in 2005, intensive monitoring of this population started.

The **main goal** of this report about the research of the North Island Robin (*Petroica australis longipes*) population in the Waitakere Ranges Regional Park is to **show and evaluate the research techniques** used to monitor the reintroduced population. Furthermore, the annual outcomes of this long term study are compared with each other to **draw conclusions about a change in abundance** of the North Island Robin population and accordingly **improve management plans**.

This report is written for the organisation Ark in the Park, Wildlife Management students and people interested in research and conservation methods.
It consist of six main- and five sub- chapters. At the beginning of this report the study species (chapter1) and the study area (chapter 2) are introduced. Chapter three summarises the methods and materials used for this research. In chapter four, the results of the previous described research techniques are shown. A discussion of the results and the used methods and materials can be found in chapter 5. The last chapter of this research report contains the conclusion and recommendation.

# 1. Study species

The target species of this research is the North Island Robin, *Petroica australis longipes* (*Toutouwai*), a small (18 cm, 35 g) insectivorous forest passerine of the Australasian flycatcher family (*Petroicidae*) [Heather & Robertson 1996]. The main physical characteristics of the North Island Robin are its short neck and large head and the upright stance on moderately long, thin legs [*Plate 1*].

This highly territorial forest bird is found in New Zealand only. It disappeared from the northern and southern parts in the early 1900s. Once widespread through the mainland (at the time of European settlement), it is now mainly restricted to a band across the central North Island from Taranaki to the Bay of Plenty and Te Urewera National Park. In 1991, North Island Robins were successfully introduced to Mokoia Island in Lake Rotorua [Heather and Robertson 1996] which should form a stable stock for later translocations. In April (16th) 2005, a group of 53 North Island Robins was translocated from Mokoia Island to the Cascade Kauri Park, part of the Waitakere Ranges Regional Park (*see 2. Study area*).

**Plate 1:** North Island Robin (♀) *© M. Leenen, Waitakere Ranges, 2008*

As many other endemic bird species in New Zealand, the North Island Robin is strongly affected by predation, especially by introduced predator species, such as cats, rats, stoats, ferrets and mynas, as well as by ongoing habitat changes (e.g. caused by possums). Additionally, habitat fragmentation, the clearance of much of prime lowland forest since European settlement caused a major decline in numbers of North Island Robins.

The monogamous North Island Robin is mainly found in mature native forests where it stays in its territory all year through. The territorial song of the male Robin can be recognized during the breeding season, from August until late December. It can be described as 'tweep-tweep- tweep- too- too- too' [Crowe 2004]. Besides, North Island Robins, both male and female use a soft call to communicate between each other, which can be described as a soft 'tok, tok, tok'. With the beginning of the breeding season, courtship behavioural feeding can be observed. The male attracts the female by singing his territorial song, in this case much softer than for territorial defensive purposes and feeds her the fresh pray. Their diet mainly consists of invertebrates but can include small fruits in summer and autumn. The favourite pray are earthworms, spiders, amphipods, beetles, moths, caterpillars, snails, slugs etc. Most of it is caught on the forest floor. By trembling one foot, the Robin induces prey to move in response to vibration. Another hunting technique is the lifting up of leaf litter to find insects underneath it.

With the beginning of the breeding season, the female collects nesting material from the forest floor. It takes her about five days to build a nest. The height of the nest can vary widely (own experience) between 1 and up to 11 meters off the ground. It is build out of bark, fibres and moss. It is bound together with cobwebs and lined with tree fern scales, moss , fine grasses and feathers or wool.

The nest is defended by both male and female birds. Hereby the bridge of white feathers located above the beak is displayed. Besides the wings and the tail are spread. Additionally to the white feather bridge, the white feathers on the base of the wings and the tale become

**Plate 2:** Defensive behaviour
*© M. Leenen,*
*Waitakere Ranges, 2008*

visible [*Plate 2*]. Although both sexes show this behaviour in threatening situations, it is most likely the female who defends the nest in that way.

Each pair of Robins may raise up to three broods. Each brood is raised in a new nest within the same territory. If one of the nests fail, they can re-lay up to six times in one season. The first clutch consists usually of two eggs, following clutches mainly of three [Heather and Robertson 1996]. The eggs are laid daily, shortly after sunrise.
The incubation period lasts between 17 and 19 days. During the incubation, the female is called off the nest in regular intervals (2-3 times an hour), to get fed by the male. The following nestling period takes another 19-22 days. Once fledged, the offspring remains dependent on parental care. Fledglings usually start foraging independently at about two weeks after leaving the nest. Nevertheless, they are mainly fed by their parents and stay 25-50 days before being outset of the territory by the male. Single fledglings are looked after by the male while the female is likely to start building a new nest.

North Island Robins become sexually mature during their first year. Until then, the outer appearance of the male North Island Robins equals the females' outer appearance.

Female North Island Robins are generally (light)brown whereas male North Island Robins have a dark brown or even black back, head and neck. The white breast of the North Island Robin therefore is more evident in male individuals [*Plate 3*].

However, the minor colour differences often only become obvious when female and male North Island Robins appear together and can be compared. Therefore it is recommended to additionally pay attention to the song of the bird. As mentioned earlier, the territorial song is sung by male North Island Robins only.

Despite its relative small size, the inquisitive and friendly character of the North Island Robin allows its monitoring and makes it perfectly suitable for various research purposes.

**Plate 3:** North Island Robin (♂)
*© M. Leenen,*
*Waitakere Ranges, 2008*

# 2. Study area

The research area, the Waitakere Ranges Regional Park encompasses more than 16.000 hectares of native forest, beaches and cliffs to the west of Auckland [Dench and Parore 2004] on the North Island of New Zealand [Plate 4]. Approximately one third of the ranges is covered in rata, rimu, totara, miro and kahikatia. Puriri, karaka, kohekohe, nikau and treeferns cover another one third of the area. Manuka is the third major component of the ranges. Mature Kauri forest is, amongst others, located in the Cascade Kauri Park area [Auckland regional council 2007].

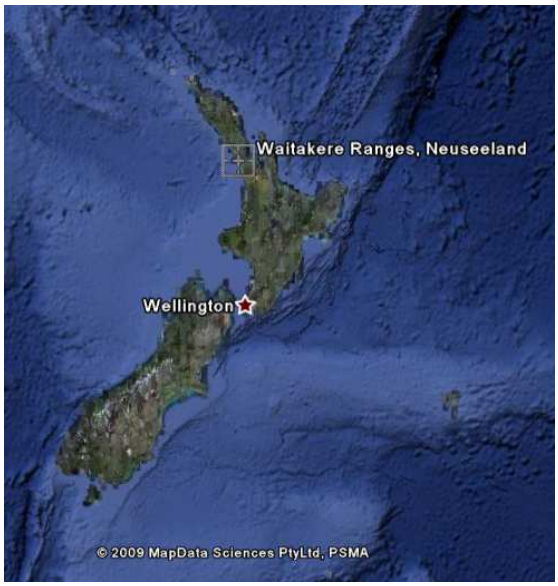


**Plate 4:** Location of the Waitakere Ranges in New Zealand

The Waitakere Ranges Regional Park including its 250 km walking and tramping tracks, is administered by the Auckland Regional Council (ARC). Within this area, approximately 1100 hectares are subject to an eco-restoration project named Ark in the Park (AIP). The Ark in the Park is a partnership between the ARC and the Waitakere branch of the organisation Forest & Bird in the Cascade Kauri Park, northern Waitakere Ranges [*Plate 5*]. Its main purpose is the control of predator species and pests.

With the start of the project in 2003 a grid of bait stations (to control mice-, rat- and possum numbers) and cordons of mustelids (stoats, weasels, ferrets) traps were placed in the area. Throughout the AIP area bait stations are located on straight lines through the bush (*see Appendix I*) in distances of 50 metres. The bait lines are 100 metres apart from each other. The bait is renewed three times a season, from late winter to mid-summer. The mustelid traps are checked and re-baited once a week in summer, and every one to two weeks in winter. To measure rat and mice abundance, monitor tunnels are placed in the area, which are checked and compared to tunnels outside the area four times a year. Additionally weed control is carried out, to enable the re-growth of endemic plant species as a key actor of the local ecosystem.

**Plate 5:** Northern Waitakere Ranges (AIP area)

Physical boundaries between the AIP area and the remaining part of the Waitakere Ranges Regional Park do not exist. This allows protected bird species as well as introduced and endemic predator species to spread throughout the whole extent of the Waitakere Ranges Regional Park. Nevertheless, another 800 hectares of predator and pest controlled forest

and private land, in the Waitakere Valley, function as Buffer zone to the AIP area. Forest & Bird as well as the ARC thereby assists landowners with traps, bait, and technical equipment. In total 2035 bait stations are to be found in the area, forming 100 km of bait lines (state may 2008) [Ark in the Park 2008].
After one year of predator control, the first translocation of endemic bird species into the Waitakere Ranges started. In 2004, 55 Whiteheads were reintroduced into the project area. Another 51 Whiteheads were released in 2008, followed by North Island Robins (53 in 2005) and Stitchbirds (59 in 2007; 60 in 2008).

# 3. Method and material

This chapter is divided into four subchapters. Chapter 3.1 describes the method used to find and identify North Island Robin territories. In Chapter 3.2 the reader receives information on how to find nesting sites. A description of the materials and methods used to band North Island Robins can be found in Chapter 3.3, followed by Chapter 3.4, the method used to catch North Island Robins. This chapter closes with a description of how to identify the sex of North Island Robins (3.5).
The below described methods have been used on an annual basis since the reintroduction of the North Island Robin population in 2005. Every year during the breeding season (from September until February) at least one researcher has been employed to monitor the population.
The monitoring of the breeding season 2008/2009 thereby took place five to six days a week. Known breeding pairs thereby were visited at least once a week and more frequently at the beginning of the breeding process to get insight into the development of the offspring (*see chapter 3.2*). Single North Island Robins were visited on a less frequent basis but nevertheless controlled regularly. Furthermore, new North Island Robin territories were searched on a daily basis, using the methods and material as described in chapter 3.1.

## *3.1 Identification of North Island Robin territories*

This part of the research is the first step that needs to be taken in order to carry out the four remaining parts (3.2, 3.4, 3.4 and 3.5). This method is not only used at the beginning but throughout the whole breeding season, to increase the chances of finding the study species in the research area.

The materials used for this method are: Maps of the research area including maps of bait lines (*Appendix I*), binoculars, plastic container with mealworms, tape mimicking the territorial song of a male North Island Robin, pencil and notebook and a compass.

To find North Island Robins, the grid of bait lines is used to cover the extent of the AIP area. While walking slowly trough the bush, following as much bait lines as possible throughout the research period, one tries to find North Island Robins by their sound and appearance. Thereby one can play the tape while walking or/and while standing still at several points in the bush that are the most suitable for North Island Robin territories. Standing still and playing the tape helps to recognize the North Island Robins that often appear and remain behind the researchers back. Throwing worms in different directions therefore helps to detect shy North Island Robins. Additionally to the bait lines that are used to cover the research area, the main streams within the research area are followed. North Island Robin territories are often close to streams or wetland areas, due to the nutritional needs of the study species. Because of the fact that North Island Robins are inquisitive birds (*see 1. Study species*), they get attracted by a variety of sounds. Since their translocation in 2005 plastic containers (filled with mealworms) are used to attract the birds. The top of a container thereby is used for tapping on its' body, creating a sound which makes the study species curious. Additionally, one can make use of a tape, mimicking the territorial call of a male North Island Robin. Male as well as female North Island Robins do respond to this tape. Female individuals just appear whereas male individuals appear and start to sing the territorial song as a respond to the tape, which is seen as an intruder. This is the most easiest and efficient method to discover North Island Robins in the dense bush and identify their sex (*see 3.5 Identifying the sex of individual birds*).
Once a North Island Robin appears, mealworms are being thrown on the ground followed by tapping sounds, which were used earlier, to attract the birds. This technique, known as classical conditioning [Pavlov 1927] helps to find the Robins back again which is essential for the remaining parts of the research. Once a Robin territory is identified, one should keep visiting it at least once a week to see whether the birds move to other territories, which is

particular the case for single females. Frequent visits to the territory should also help to encounter courtship behaviour (e.g. the male is feeding the female) or nesting behaviour (e.g. a male North Island Robin is calling the female off the nest to feed her; a female North Island Robin is collecting nesting material etc.). Whenever one of these behavioural patterns can be encountered one should move on to the second step, which is described in the following subchapter.

## *3.2 Finding nesting sites*

This method is needed, whenever a pair of North Island Robin displays courtship behaviour. Due to the fact that the study species breeds approximately three times during one breeding season, this method is used throughout the whole research period.

The materials used for this method are: Maps of the research area, binoculars, plastic container with mealworms, tape mimicking the territorial song of a male North Island Robin, pencil and notebook, blue ribbon, extension mirror and a compass.

In the dense bush of the Waitakere ranges, each tree and scrub can function as a potential nesting site. Being in the territory of a pair of North Island Robins, using either the tape or the "tapping- technique" one should be able to make visual contact with the North Island Robins. When the breeding season has already started, it is mostly the male appearing while the female stays on the nest. It is the behaviour of the male which then becomes of particular importance. Feeding the male with mealworms is consequently the starting point of finding the nest. There are different ways in which the male North Island Robin could react:

1. He eats all of the mealworms;
2. He eats only the first couple of worms, while he:
   2.1. stores the rest of it in trees and scrubs; or
   2.2. keeps the remaining worms in its bill, singing its territorial song to call the female (off the nest) (*Plate 5*);
3. He eats none of the mealworms but keeps them in its bill while calling for and flying to the female.

Whenever a behaviour as described in case 1 can be observed, there is not yet any sign of courtship behaviour and one should go on, searching for the female. If the female bird can be found nearby the place at which the male appeared, one should keep visiting this territory in more frequent intervals (e.g. every two days). The nesting activities are likely to occur at any of the following days. Case 2.1 describes the behaviour of a male North Island Robin, which either has not found a partner or simply has not started its courtship behaviour yet. Whenever observing this behaviour, one should react as advised for case 1. The courtship behaviour might start during the very next days.

Only case 2.2 and 3 are examples of courtship behaviour. Both of these cases should end up with the male feeding the worms to the female. When the female does not appear, the singing of the male can be interpreted as territorial behaviour. Nevertheless, one should keep following the male, because of the fact that he could call for the female from different places throughout his territory. When the female appears, the next step to take is to follow her, as soon as she flies off again. In

**Plate 5:** North Island Robin (♂) carrying mealworms in its bill, © *M. Leenen, Waitakere Ranges, 2008*

case that she is already incubating on a nest, she will fly back to the nest directly or preens herself near the nest, after being fed by the male. The maintenance of the feathers thereby often ends up by wiping the beak on a twig.
A closer observation of the feathers on the breast and below is recommended, if an additional indication for a breeding activity is needed. The female prepares for nesting by plucking feathers off in a straight line, starting at the lower breast. Consequently, when incubating the eggs, the bare and warm skin is exposed to them. Whenever this line of dark feathers on the lower breast can be observed, they female either just was or still is incubating.

Following the female North Island Robin through the dense bush and being able to see in which tree or scrub her flight ends, is not simple. Therefore, the earlier described technique of attracting the male might have to be repeated several times to get insight into the nest location. Sometimes the female flies off the nest directly, when she hears the tapping sound, in order to get some mealworms directly from the observer. When following the female, one should observe her behaviour. As soon as one is close to the nest, the female bird will try to scare the intruder away by spreading her wings and displaying the bridge of white feathers above her bill (*Plate 2*). This defensive behaviour, as said, is an indication of being close to the nest. One should step back and watch her from a save distance. Normally the female will return to her nest as soon as the intruder keeps a particular distance. This is the best moment and method to find the nest, by observing her flying back on it.

Once the nest is found, the nesting site is marked with blue ribbon. If the bird territory can be reached by following a bait line, the way from the bait line to the nest is marked with blue ribbon. Is the territory or nesting site easier accessible from a main foot path, the blue ribbon should start here. By placing the ribbon in short distances from each other, around trees or scrubs on eye height of the observer, one can make sure that the nesting site can also be found by other researchers. Additionally one can write down the plant species in which the nest is located as well as the approximate distance to the next bait line or food path. Furthermore the cardinal point of the nesting site can be written down.

To get insight into the state of the nest, mealworms are offered to the female to make her get off the nest. In this research, an extension mirror (additionally attached to a stick for high nests) is used to look inside the nest. The number of eggs, chicks, or eggs and chicks are written down, together with the band combination of the parental birds and the territory the nest was found in (*see Appendix III*). From that point onwards, the nest should be visited at least twice a week to monitor its development and encounter possible changes in the nest or in the behaviour of the mature birds, which might indicate the state of the current breeding process. As mentioned in chapter 1, the incubation period lasts between 17 and 19 days. If the female during this time stays off the nest for 30 minutes or more, the nest can be considered to have failed. In this research, eggs from one failed nest were tested for fertility at the Auckland Zoo, to get insight into the reason of failure.
If a nest does not fail and the chicks have hatched, one should be able to observe both female and male North Island Robins flying to the nest in frequent intervals (increasing frequency with increasing age of the chicks) to feed the offspring.

In order to apply leg rings on the altricial North Island Robin chicks (*see next subchapter)* it is important to estimate their age. Chicks that are too young (<10 days), are too fragile to be taken out of the nest. Furthermore, most of their plumage is missing, which makes them vulnerable in terms of losing heat. On the other hand, chicks that are banded too late (>14 days), are likely to fall out of the nest, ones they are put back into it. They are able to move their legs with more strength and often have difficulties to find enough space next to their siblings, once they are taken out of their position in the nest. The chicks therefore should be banded between 10 and 14 days of age [own experience]. A close observation of the nest therefore is crucial to minimise the risks involved in the method of applying leg rings on chicks.

To calculate the hatching day of the chicks the nest has to be found in the first couple of days. One egg is laid per day (*see 1. Study species*), which enables the researcher to make assumptions about the hatching day if the number of eggs in the nest increases from one day to the next. This technique requires intensive monitoring, at least in the early stage of the breeding process. Once this stage has been passed without being noticed, the only accurate method to estimate the age of the chicks is to discover hatched chicks together with eggs in one nest. If one of these eggs has hatched on the following day, the discovered chick of the previous day is one day old. Another, less valid method of estimating the age of the chicks is to make assumptions according to their outer appearance. Here the completeness of the plumage and the general size of the chick can be used. Furthermore, the state of the eyes of young chicks can be an indication of age. The eyes of North Island Robin chicks usually open between the eleventh and fourteenth day after hatching [own observation].
As soon as the chicks are between 10 and 14 days of age, the next step, as described in the following subchapter, can be taken.

## *3.3 Applying leg rings on chicks and unbanded mature birds*

Leg rings on birds are amongst other things useful for future identification of the birds' origin, age and gender. In this research not only chicks where banded but also any mature birds that were found unbanded. The main banding activity is the same for chicks as well as for mature birds.

The materials used for this method are: Cotton bags, small cotton towel, banding gear, notebook, pencil and banding list.

Once the nest of the North Island Robins has been discovered and the chicks are about ten days old, one should apply the leg rings for any future identification of the birds.
Before removing the chicks from the nest, one should prepare the banding gear (*Plate 6*) and search for a good place for the banding, not too far away from the nest. After that, while the female bird is off the nest, one should take all the chicks out of the nest, carefully placing each one of them into a dark bag of cotton or some other soft material. The chicks should all be put into separate bags. The nest should be kept warm, by putting a towel or a piece of likewise material in it.

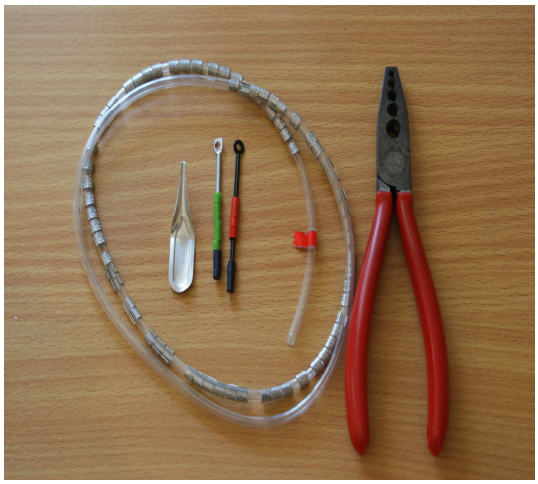

**Plate 6:** *Banding gear, © Masha Leenen*

Once the chicks are removed from the nest, one should carefully get one chick out of the bag, holding its head between the forefinger and the middle finger, while the chicks' body is laying in the hand (*Plate 7*). By using a special metal staff, the leg rings can be extended. After putting one leg ring on the metal staff, one leg of the bird should be hold into the little trough at the other end of the metal staff (*Plate 6*). Now the leg ring can be pulled over the leg. The easiest way to apply leg rings is to always start with the top ring of each leg. The second ring then can be easily attached by carefully pushing or pulling the top ring up.
One should always make sure, that the right leg rings are applied on the right leg. The bands are read from the birds' left leg to its right leg, from the top to the bottom ring. The bird shown on the cover of this report has the band combination green/red- orange/metal (GR-OM). The metal band is the most important band because it carries a special number combination, unique for each bird. When finding the bird dead or wounded, one is able to identify the origin and identity of the bird. Therefore, the colour combination as well as the number on the metal

ring should be written down before putting the chick back into the nest. The sheet used to document banding activities in the Waitakere Ranges Regional Park can be found in *Appendix II*.

The metal band should be squeezed with a nipper until the gap between the two ends of the band disappear. When all the chicks from one nest have been banded, they should directly be put back into the nest. In order to make sure, that they do not fall out of the nest, one can hold a hand on top of the nest until each chick has found an appropriate place and stops moving.

In this research, the observer remains in the territory until the female North Island Robin returns to the nest. Any behavioural patterns of the parental birds thereby are written down in the notebook (*see Appendix III*).

**Plate 7:** *Method of holding a bird, © Masha Leenen, Waitakere Ranges, 2008*

The method used for banding mature birds is the same than the method described above. The only exception is the method of catching the bird. While chicks can be simply taken out of their nest, mature birds have to be caught, using a clap trap and mealworms, functioning as bait. How mature North Island Robins are caught is described in the next subchapter.

## *3.4 Catching North Island Robins*

The catching of North Island Robins in this research is only carried out for the purpose of banding unbanded birds.

The materials used for this method are: Clap trap, plastic container with mealworms, tape mimicking the territorial song of a male North Island Robin, pencil and notebook (,dark cotton bag and banding gear).

In order to catch adult North Island Robins, one need a clap trap as shown in *Plate 8*, including the gear to install it on the forest floor, and mealworms which are functioning as bait. Additionally, in case that the bird is caught to be banded a dark cotton bag and the banding gear (*Plate 6*) is needed.

The trap should be installed on a flat spot on the forest floor, in the territory of that particular bird. After installing it on the forest floor, the bird should be attracted by tapping with the plastic container of mealworms. While the North Island Robin is observing the researcher, several mealworms should be put in the middle of the spot that will be covered by the net. When the North Island Robin has been fed with mealworms before, it will now carefully hop on the cleared spot in order to get the remaining mealworms. Once the Robin has taken several mealworms into its beak, it feels save and is going to take the rest

**Plate 8:** Clap trap, *© Masha Leenen, Waitakere Ranges, 2008*

of the worms. This is the perfect moment to let the trap fall down on the bird, by blowing into the tube that is directly connected to the trap (*Plate 8*). By blowing into the tube, a metal screw is moved, which holds the trap in its upright stance. Consequently the trap falls down on the ground, thereby covering the bird. As fast as possible one should then try to free the bird from the net it might get entangled by. The best method to free the bird is by using both hands, one on the top and one underneath the net. After entangling the bird, it should be put into a cotton bag until the banding gear is prepared. Preferable this is already done before catching the bird. Once the banding gear is prepared and the bird is caught, the steps as described in chapter 3.3 can be performed to apply the leg rings.
Once the banding has been finished and the band combinations and metal band numbers have been written down, the bird can be released by opening the hand in which it was hold. To decrease the time that the bird is handled, two people should work together. Thereby the tasks can be divided. In this research, one person is blowing into the tube while the second person can free the bird once the net has been fallen down. While the bird is released from the clap trap, the first person can move on and get ready for banding the bird.

## *3.5 Identifying the sex of individual birds*

Identifying the sex of North Island Robins is difficult. As mentioned in chapter one, the plumage of adult male and female North Island Robins almost looks similar and can hardly be distinguished without seeing both sexes next to each other. The plumage of juvenile male fledglings is congruent with the plumage of female individuals during their first year. This is due to a delayed plumage maturation [Berggren et al. 2004]. The main plumage differences between male and female birds can be seen after the second year (ASY). The plumage of ASY males is slightly darker with more prominent white breast feathers. Nevertheless, this minor sexual dimorphism is mainly noticeable during direct observation of both sexes. Therefore, additional sex specific behavioural patterns should be included into the identification process. These can be observed during courtship behaviour, territorial defence and during the breeding process. In case of courtship behaviour the male North Island Robin calls for the female, as described in chapter 1, to feed her the fresh pray. The feeding as well as the singing thereby are distinct indications of a male individual. During the breeding process, the male North Island Robin hunts for prey and calls the female off the nest to feed her, whereas the female bird incubates and spends most of its time on the nest.
In case of fledglings, the identifying of sexes by looking at their behaviour is almost impossible. The only chance to identify the sex of fledglings is to look at their behaviour, once they have found their own territory. Male North Island Robins will soon start to sing to defend their territory and attract a female.

The results of this research, using the above described methods and materials, are withdrawn in the following chapter.

# 4. Results

This chapter presents the results of the five moths study of the reintroduced North Island Robin population in the Waitakere Ranges Regional Park. Besides the current results, this chapter also gives an overview of the previous three breeding season since the reintroduction of this population in 2005.
A discussion of the results and methods used, can be found in chapter 5.

Using the method and material as described in chapter 3, 13 adult birds (eight female, five male North Island Robins) were found in the Waitakere Ranges Regional Park. Table 1 shows the area in which the individual and breeding pairs have been found. In addition, the band combination, the sex, the nest discovery date and the number of eggs and fledglings are reported.

| **Area/ Bait line** | **Band comb. ♂** | **Band comb. ♀** | **Nest discovery date** | **No. eggs** | **No. fledglings** |
|---|---|---|---|---|---|
| Auckland City Walk | GR-OM | GB-OM | 18.09.2008 | 2 | 0 |
| | | | 04.10.2008 | 3 | 0 |
| Li | BY-OM | GO-RM | 20.09.2008 | 2 | 1 |
| | | | 30.10.2008 | 3 | 3 |
| | | | 06.01.2009 | 3 | 3 |
| TB | B-M | BW-OM †* | 16.09.2008 | 2 | 2 |
| TA | B-M | BW-RM | 13.01.2009 | 2 | 2 |
| R13 | WW-RM | BW-RM | 25.09.2008 | 2 | 0 |
| | | | 17.10.2008 | 2-3 | 2-3 |
| | | | 18.12.2008 | 3 | 0 |
| Wainamu bush track | Unbanded | YG-OM | - | - | - |
| Piha | - | BR-RM | - | - | - |
| T17 | - | GM-R | - | - | - |
| L6 | - | R-GM | - | - | - |
| **Total:** | **5** | **8** | | **24** | **13** |

**Table 1:** *North Island Robins of breeding season 2008/2009*
*This female North Island Robin died after suffering from breathing problems.

As shown in table 1 above, from the 13 North Island Robins found, six pairs have been formed throughout the breeding season 2008/2009. From these six pairs, five pairs where observed being actively breeding. Only one of the six pairs was not breeding but performing courtship behaviour. This pair was found outside the AIP area, thus in a part of the Waitakere Ranges Regional Park, which is not predator controlled. Below, the observations of each pair that has been monitored are summed up.

**Breeding pair at the Auckland City Walk:**
One of the five breeding pairs, the newly banded pair at the Auckland City Walk, was assumed to be infertile after two of their nests (in total five eggs) had failed. Intensive monitoring of this pair during the incubation period has shown that the average time the female spend off the nest was longer than compared to other females. Nevertheless, she never stayed off the nest for more than 30 minutes during observations.
The eggs of the second nest were examined by a veterinarian from the Auckland Zoo and declared to be infertile. Assumptions about the cause of the infertility could not have been made by examining the eggs only. The male of this pair left the territory after the second nest had failed. The female remained in her territory.

This pair is assumed to be the infertile pair that was already monitored in the breeding season 2007/2008. These birds were found unbanded and produced two failed nests as well.

**Breeding pair at bait line Li:**
The breeding pair at bait line Li, as shown in table 1, had three nests with eight eggs in total. Of these eight eggs, one remained undeveloped. The other seven eggs hedged and the chicks reached the fledgling stage and left the parental territory. During the incubation period of the third nest, the male North Island Robin left the territory to outset one of the remaining fledglings of the second nest. This male remained absent until the end of this research. The female thus raised the last brood on her own.

**Breeding pair at bait line TB:**
The breeding pair at bait line TB, known from the previous breeding season had one nest with two eggs. Once the chicks had fledged, the female died after suffering from breathing problems for five days. The two fledglings were looked after by the male.

**Breeding pair at bait line TA:**
This breeding pair developed at the end of the breeding season, after the male that earlier raised its young at TB lost his female. This pair produced two fledglings at the very end of the breeding season in February. The female BW-RM, which already had three nests at bait line R13 returned to her former 'partner' from the previous two breeding seasons, after two of three nests at R13 had failed (*see below*). With the appearance of the female in her erstwhile territory, at least one unbanded fledgling has been seen nearby the new nesting site. This fledgling has been caught and banded and is assumed to originate from the females' nest at R13.

**Breeding pair at bait line R13:**
The female described above had three nests with the male WW-RM at bait line R13, before returning to her former male at TA. The first nest with two eggs was observed to be empty shortly after the discovery date. This failure was presumable caused by predation. The second nest of this breeding pair could not have been monitored directly because of its height. The number of eggs or chicks therefore could have only been estimated according to observations from a distance. At least two chicks have been seen in the nest. Later on, at least two unbanded fledglings were seen in the territory. The catching and banding of these shy fledglings was not possible due to their behaviour and the roughness of the territory.
The third nest, with three eggs, failed after the female stopped incubating the eggs. Shortly after this observation the female left the territory and was found back at bait line TA (*see above*) while the male remained in its territory.

**Non- breeding pair at the Wainamu bush track:**
This pair of North Island Robins was the only pair to be observed non-breeding. Nevertheless, courtship behaviour was monitored. The origin of the unbanded adult male remains unknown.

In addition to the North Island Robin pairs described above, three single females were found. Two of them (GM-R and R-GM) were found in the AIP area, where they have been successfully breeding since their translocation to the Waitakere Ranges Regional Park in 2005 (*see Appendix II*). Both female birds have not been seen together with their former breeding- 'partners' during this research. In addition, one more single female North Island Robin has been found in an area of the Waitakere Ranges Regional Park, Piha, which is privately predator controlled, thus not part of the AIP area.

Besides, three fledglings of the current breeding season were seen in their new territory. One of them, WB-OM, originating from the pair of Robins at Li, could clearly be identified as a male bird. The sex of the second fledgling found and banded at TA, assumed to originate from R13, remains unknown. The third fledgling, GO-OM, also originating from the pair of

North Island Robins at bait line Li, was found in the bush belonging to a private property outside the AIP area and has been identified as a female North Island Robin.

Table 2 below shows the number of breeding pairs and nests found per year, since the reintroduction of the North Island Robin in 2005. Remarkable differences between previous and the current breeding seasons are described in detail below.

| Breeding season | No. of breeding pairs | No. of found nests | No. of chicks | No. of banded chicks | Average no. of chicks per ♀ | No. of clutches per pair |
|---|---|---|---|---|---|---|
| 2005/2006 | 5 | 11 | 24 | 14 | 4.8 | 2x3<br>2x2<br>1x1 |
| 2006/2007 | 5 | 12 | 23 | 17 | 4.6 | 3x3<br>2x2 |
| 2007/2008 | 8 | 15 | 24 | 11 | 3.4 | 1X3<br>5X2<br>2x1 |
| 2008/2009 | 5 | 10 | 13 | 12 | 3.3 | 2x3<br>1x2<br>2x1 |

**Table 2:** *Overview of the four breeding seasons*

As shown in table 2 above, the number of breeding pairs found in the current breeding season equals the number of breeding pairs that were found in the breeding season 2005/2006 and 2006/2007. In the first breeding season after the reintroduction of the North island Robin population, one more nest than during the current breeding season has been found. Remarkable is the number of chicks that is almost twice as large in 2005/2006 as it is in breeding season 2008/2009 (for reasons see chapter 6).
Outstanding is the number of breeding pairs found in 2007/2008. Three more pairs than in any other breeding season were found. Yet, the average number of chicks per female North Island Robin is very low, compared to the previous breeding seasons.

A further discussion of the methods and materials used in this research, which lead to the results above, can be found in the following chapter.

# 5. Discussion

There are several aspects concerning the used methods and the performance of the research that might have an impact on the research results.
In this chapter therefore the methods and materials used, as described in chapter 3 are discussed. After that, the predator control activities of the AIP project are discussed, followed by a general discussion of the suitability of this area as an open sanctuary. Improvements for future monitoring and management activities are given in the conclusion and recommendation (Chapter 6).

**Identification of North Island Robin territories**

Using the grid of bait lines of the AIP area to find North Island Robin territories is a helpful measurement to cover the whole size of the area. However, some bait lines are difficult accessible and require a high condition of the researcher in addition to good weather conditions. The total size of 1100 hectares of the AIP area additionally complicate the research considering the fact that annually only one researcher is employed to both monitor North Island Robins and find new territories. This problem, not unknown to the AIP, has tried to been solved by including other volunteers in this research. Thereby, volunteers maintaining the grid of bait lines and mustelid traps were equipped with a tape, mimicking the song of a male North Island Robin, as used by the researcher. Unfortunately this has only been done once during the breeding season and resulted in several wrong observations. Often, the Tomtit (*Petroica macrocephala*), part of the same family than the North Island Robin, was mistaken for the latter.
Using a tape, mimicking the territorial song of a male North Island Robin, to attract the study species was very helpful. Nevertheless, the consequences of this used method for the study species are unknown. Possible harmful effects, such as stress for the male individuals can not be excluded.

**Finding nesting sites**

Using the methods and materials for this particular part of the research has been successful. Each nest in the known North Island Robin territories has been found. Yet, the intensive and frequent monitoring of the nest, by using an extension mirror, have had stressful impacts on the study species (mainly female individuals). As shown in the results, one female bird at bait line R13 stopped incubating shortly after the nest had been discovered and monitored. The last nests of this female, with a different male individual, therefore has not been monitored intensively, by using the extension mirror in the early stage of the breeding cycle, which resulted in a successful development of the chicks.

**Applying leg rings on chicks and unbanded mature birds**

The methods and materials used to apply leg rings on chicks and unbanded mature birds were suitable. Each single banded bird of this and previous breeding seasons survived this operation and remained inquisitive and friendly towards the researcher.

**Catching North Island Robins**

The method of catching North island Robins has worked out well. Three out of four unbanded birds have been caught and banded by using this technique. The one remaining bird could not have been could because of its wariness. One negative aspects of the used clap trap is the risk, that it might injure the bird while falling onto the ground. This has not happened yet but is well known to have been a problem in similar projects with the same target species, as on Tiritiri Matangi Island.

In addition to the above described research methods, the methods of excluding predator species from the AIP area should be discussed, because of their immense impact on the survival of the reintroduced North Island Robin population (amongst other reintroduced endemic bird species). Besides, the suitability of this area as an open sanctuary and the use of some current management activities are discussed.

**AIP conservation activities and problems**

As mentioned in chapter 2, to exclude introduced mammal predator species, the AIP area is provided with a grid of bait lines against possums, rats and mice as well as with mustelid traps. Due to frequent re-baiting of the bait stations and the regular control and additional re-baiting of the mustelid traps, the number of these predator species has decreased immensely. Between July 2007 and June 2008 84 stoats, 12 weasels, 5 ferrets, 15 hedgehogs and 162 rats have been caught [Ark in the Park 2008]. Nevertheless, one North Island Robin nest has been lost due to predation.

Records of the bait stations in this area show that the number of bait that has been eaten decreased. Concrete numbers of dead possums, rats and mice are not available. Nevertheless, the re-growth of plant species on open parts of the bush shows the change in possum, rat and mouse abundance.

Despite this improvement of the area one big problem remains: pets. Dogs are still allowed on the main walking ways of the AIP. Numerous signs inform the owners that their dogs have to be kept on a leash, which unfortunately often is ignored. Roaming dogs are a big threat for the North Island Robin population which spends most of its time on the ground and was translocated from a mammal predator free island (*chapter 1*). A natural fear of dogs consequently could not have been monitored (own observations). In addition to this problem, cats (wild and domesticated) enter the area to hunt. In 2008 the organisation therefore added cat traps to the breeding territories of North Island Robins and successfully caught two cats. Nevertheless, cat sightings in the AIP area increased and conversations with cat owners in the surrounding of the area have not shown the desired effect. One female North Island Robin which died after suffering from breathing problems [*chapter 4*] is assumed to have been attacked by a cat. It was in the territory of this breeding pair that one cat has been caught twice.

The AIP is an open sanctuary. As mentioned in chapter 2, physical boundaries between the AIP and the remaining part of the non predator controlled Waitakere Ranges Regional Park do not exist. In addition to mammal predator species that are enabled to enter the area, it also allows the contrary. It enables reintroduced bird species to fly to other parts of the Waitakere Ranges Regional Park, which are not yet suitable for the protection of these species. Furthermore, the research of the North Island Robin population is restricted to the AIP area. Therefore, the found number of North Island Robins in this area can never be used to make general conclusions about the success of the reintroduction. Too many North Island Robins might not be monitored and included into this research because of being undetected and too far away from the study area.

# 6. Conclusion and recommendation

The results, as shown in chapter 4 show that this breeding season, three less breeding pairs than compared to the previous breeding season (2007/2008) have been found. The extreme dryness of the areas in which two breeding pairs from the previous breeding season were found, could explain why these pairs have left their territory in which one of them already was breeding for more than one season. In addition, as mentioned in the discussion above, cat sightings have increased, also in the area (Whatitiri track [L3; L5.5]) where two of these breeding pairs were found. Moreover, the number of male North Island Robins has been decreasing drastically. Two male individuals (G-GM and YM-) that where breeding in the previous breeding season have disappeared. Of these pairs only the single females (GM-R and R-GM) remained in their territory and could have been monitored in the current breeding season. As mentioned in chapter 4, one additional male (BY-OM) disappeared while having its third clutch. The loss of these males can not be explained with certainty.

The low average number of chicks per female, compared to the first two breeding seasons can be explained by the number of females who actually where productive. This breeding season only four females where actually producing offspring. One of these females died after her first clutch, another female had one successful and two failed nests before she left her male and had one more nest with her 'old' male from previous breeding seasons. This also explains the low number of chicks.
The loss of male North Island Robins and one female North Island Robin since the previous breeding season is alarming and should if possible be further investigated.

Nevertheless, the remaining breeding pairs of the current breeding season were very productive, showing that the AIP area can be suitable for a population of North Island Robins, if sources of danger are diminished. Therefore, recommendations and conclusions concerning the activities within the AIP area are made on the following page. Additionally the research methods can be improved. Recommendations for the latter can be found in the following section.

<u>Recommendations for research methods:</u>
In order to be able to monitor already discovered North Island Robin breeding pairs and continue the search for new North Island Robin territories, more than one researcher or an earlier beginning (in advance of the breeding season) of the research is required. In addition, the already taken measures, to involve other volunteers in the search for new North Island Robin territories could be improved by ensuring the volunteers' ability to visually and audible recognize a North Island Robin.

To minimize possible negative effects on the study species it should be recommended to decrease the frequency by which the tape of the male North Island Robin is used, until more information according to this subject are collected.
Problems that occurred during monitoring sessions of nests, as described in the discussion above should result in a higher precaution when monitoring the state of nests at the very beginning of the incubation period. The frequency of direct nest observations should be decreased, the distance to nests during observations in general should be increased.

Before catching North Island Robins that are shy, it is recommended to regularly visit the bird that should be caught to let it get used to humans and the essential ritual of picking up mealworms, that are later used as bait for catching the bird.

General conclusion about the AIP and general recommendations:

The predator control, that takes place in the AIP has shown its effectiveness. Nevertheless, the problem of cats is not yet solved. Therefore additional cat traps on the edged of the AIP area are needed and strongly recommended.

The study area is generally suitable to function as open sanctuary. The regenerating forest provides numerous territories which can be used by North Island Robins and other already released endemic bird species. Nevertheless should dogs be excluded from the area, which are a threat to reintroduced bird species that have not had the time to adapt to the danger of mammal predator species.

A main conclusion about the success of the reintroduced North island Robin population in the predator controlled area of AIP can not be made because of the fact that many individuals of the study species may not have been detected due to the research methods and the dispersal of the North Island Robins throughout the whole Waitakere Ranges Regional Park and its surrounding.

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# Appendix I – Map of bait lines and stoat traps

# Appendix II – Banding list

**BANDING LIST of the Waitakere Ranges Regional Park**

**- NORTH ISLAND ROBIN –**

| Band comb. | Band No. | Date | Age | Location | Father | Mother | Commends |
|---|---|---|---|---|---|---|---|
| | | **Season 2005/06** | | | | | |
| BR-RM | B84288 | 19.11 | 12-15 days | T17 | - | - | - |
| BB-RM | B84289 | 19.11 | 12-15 days | T17 | - | - | - |
| BW-RM | B84290 | - | juvenile | L2 | GM-G | M-RG | ♀ |
| BG-RM | B84291 | 01.12 | 17-18 days | L2 | GM-G | M-RG | - |
| BY-RM | B84292 | 01.12 | 17-18 days | L2 | GM-G | M-RG | - |
| WR-RM | B84293 | 01.12 | 7-9 days | L6 | RM- | R-GM | - |
| WB-RM | B84294 | 01.12 | 7-9 days | L6 | RM- | R-GM | - |
| WW-RM | B84295 | 01.12 | 7-9 days | L6 | RM- | R-GM | - |
| WG-RM | B84296 | 16.12 | 7-9 days | Ld | R-M | M-G | - |
| WY-RM | B84297 | 16.12 | 7-9 days | Ld | R-M | M-G | - |
| GR-RM | B84298 | 16.12 | 7-9 days | Ld | R-M | M-G | - |
| GB-RM | B84299 | 27.12 | 7-9 days | T17 | GM-Y | GM-R | - |
| GW-RM | B84300 | 27.12 | 7-9 days | T17 | GM-Y | GM-R | - |
| OR-RM | B94001* | 23.03 | 6-10 days | Ed Block | - | Unbanded | - |
| | | **Season 2006/07** | | | | | |
| OB-RM | B94002 | 29.09 | 15 days | L3 | YM- | M-RG | - |
| OW-RM | B94003 | 29.09 | 15 days | L3 | YM- | M-RG | - |
| OG-RM | B94004 | 29.09 | 10 days | L6 | Unbanded | R-GM | ♀ |
| OY-RM | B94005 | 29.09 | 10 days | L6 | Unbanded | R-GM | - |
| BR-OM | B94006 | 10.10 | 10 days | T17 | - | - | - |
| BB-OM | B94007 | 22.10 | 10 days | AN2 | - | - | - |
| BW-OM | B94008 | 22.10 | 10 days | AN2 | - | - | ♀; † in 2008 |
| BG-OM | B94009 | 17.11 | 5-8 days | L3.5 | YM- | M-RG | - |
| BY-OM | B94010 | 17.11 | 5-8 days | L3.5 | YM- | M-RG | ♂ |
| BO-OM | B94011 | 24.12 | ›12 days | AN2 | RB-M | RY-M | - |
| YR-OM | B94012 | 24.12 | ›12 days | AN2 | RB-M | RY-M | - |
| YB-OM | B94013 | 28.12 | 9 days | T17 | GM-Y | GM-R | 1 egg not hatched |
| YW-OM | B94014 | 28.12 | 13 days | ANA-> AN0 | B-M | BW-RM | New pair |
| YY-OM | B94015 | 28.12 | 13 days | ANA-> AN0 | B-M | BW-RM | - |
| OY-OM | B94016 | 28.12 | 13 days | ANA-> AN0 | B-M | BW-RM | - |
| YO-OM | B94017 | 17.02 | 10 days | AN2 | RB-M | RY-M | - |
| YG-OM | B94018 | 17.02 | 10 days | AN2 | RB-M | RY-M | - |

| | | **Season 2007/08** | | | | | |
|---|---|---|---|---|---|---|---|
| OR-OM | B94019 | 02.10 | 15 days | TA | B-M | BW-OM | - |
| OB-OM | B94020 | 02.10 | 15 days | TA | B-M | BW-OM | - |
| OW-OM | B94021 | 05.10 | 10 days | L3 | YM- | M-RG | - |
| OG-OM | B94022 | 05.10 | 10 days | L3 | YM- | M-RG | - |
| OO-OM | B94023 | 19.10 | 12 days | T17 | G-GM | GM-R | - |
| RR-OM | B94024 | 19.10 | 12 days | T17 | G-GM | GM-R | - |
| RB-OM | B94025 | 18.11 | - | TA | B-M | BW-RM | Jumped out of nest after banding |
| RW-OM | B94026 | 18.11 | - | TA | B-M | BW-RM | Jumped out of nest after banding |
| RG-OM | B94027 | 18.11 | - | TA | B-M | BW-RM | Jumped out of nest after banding |
| RY-OM | B94028 | 14.02 | 10 days | TA | B-M | BW-OM | - |
| RO-OM | B94029 | 14.02 | 10 days | TA | B-M | BW-OM | - |
| | | **Season 2008/09** | | | | | |
| GR-OM | B94030 | 02.09 | Adult | ACW | unknown | unknown | Unbanded adult ♂ |
| GB-OM | B94031 | 02.09 | Adult | ACW | Unknown | unknown | Unbanded adult ♀ |
| GG-OM | B94032 | 28.09 | 10 days | TB | B-M | BW-OM | - |
| GY-OM | B94033 | 28.09 | 10 days | TB | B-M | BW-OM | - |
| GO-OM | B94034 | 13.10 | 14 days | Li | BY-OM | OG-RM | ♀ |
| WR-OM | B94035 | 20.11 | 10 days | Li | BY-OM | OG-RM | - |
| WB-OM | B94036 | 20.11 | 10 days | Li | BY-OM | OG-RM | ♂ |
| WW-OM | B94037 | 20.11 | 10 days | Li | BY-OM | OG-RM | - |
| WG-OM | B94038 | 22.01 | Fledgling | TB | - | - | From R13? |
| WY-OM | B94039 | 26.01 | 10 days | Li | BY-OM | BY-OM | ♂ absent |
| WO-OM | B94040 | 26.01 | 10 days | Li | BY-OM | BY-OM | ♂ absent |
| GW-OM | B94041 | 26.01 | 10 days | Li | BY-OM | BY-OM | ♂ absent |
| OM-BR | | 09.02 | 12 days | TA | B-M | BW-RM | - |
| OM-BB | | 09.02 | 12 days | TA | B-M | BW-RM | - |

## Appendix III - Notebook entries

| Date | Transect/Line | Purpose | Birds seen ♀ | Birds seen ♂ | Nest location | Nest observations | Notes/ Things done |
|---|---|---|---|---|---|---|---|
| **Week 1** | | | | | | | |
| 01.09.2008 | Auckland city walk (ACW) | Introduction to the area | R-M | - | - | - | Single ♀ at T17 |
| | Watitiri track | Finding Robins | - | - | - | - | Practise to set up trapping gear |
| 02.09.2008 | ACW | Finding 2 known unbanded Robins | GB-OM | GR-OM | - | - | **Catching** and **banding** the two unbanded Robins |
| | Pukematekeo Track | Finding 1 known unbanded Robin | - | - | - | - | No Robins found |
| 03.09.2008 | ACW | Observing the new banded Robins | GB-OM | GR-OM | - | - | Both Robins in same territory → a pair?! |
| | Anderson track | Finding Robins | - | - | - | - | No Robins found |
| 04.09.2008 | Cascade track | Finding Robins | R-GM | - | - | - | Single ♀ at L6 |
| 06.09.2008 | Lower Kauri track | Finding Robins; Bait line | - | - | - | - | No Robins found at Ld |
| **Week 2** | | | | | | | |
| 08.09.2008 | ACW | Finding Robins | - | - | - | - | No Robins found |
| | Cascade track | Finding Robins | - | - | - | - | No Robins found at F5 |
| | Anderson track | Finding Robins | BW-OM | - | - | - | Single ♀ seen at TA |
| 09.09.2008 | Whatitiri track | Finding Robins | - | BY-OM | - | - | Single ♂ seen at Li 21 |
| 10.09.2008 | Anderson track | Finding Robins; Bait line | BW-OM | B-M | - | - | Walked track TA and TB; ♂ feeding |

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| | | | | | | | the ♀; Used to be a pair in earlier breeding seasons |
| 11.09.2008 | Lower Kauri track | Finding Robins | - | - | - | - | No Robins found |
| 13.09.2008 | Whatitiri track | Check Li for female Robin | BY-OM | - | - | - | ♂ singing/ calling female, she did answer but did not appear (Li 21/22) |
| | ACW | Check new banded Robins | GB-OM | - | - | - | ♀ appeared alone at 1st fence ACW; Flew to opposite site of the stream |
| **Week 3** | | | | | | | |
| 15.09.2008 | Upper Kauri track | Finding Robins; Bait line | BW-RM | WW-RM | - | - | ♂ feeding the ♀at R13 → a pair?! |
| | Robinson Ridge track | Finding Robins | - | - | - | - | No Robins found |
| | Cascade track | Finding Robins | R-GM | - | - | - | Single ♀ at L6 |
| | ACW | Finding Robins; Check Robin at T17 | GB-OM | GR-OM | - | - | ♀eating worms, ♂ appeared later (singing) on the other site of stream; No Robin at T17 |
| 16.09.2008 | Anderson track | Searching for nest | BW-OM | B-M | Top of dead Ponga tree at TB4; Height: 1m | ♀ sitting on the nest | **1st nest of the breeding season** |
| 17.09.2008 | ACW | Searching for pair of Robins | GB-OM | GR-OM | - | - | Robins definitely a pair, nest must be at other site of stream close to car park |
| | Whatitiri track | Searching for pair of Robins, try to identify female at Li | - | BY-OM | - | - | ♂feeding ♀ twice; no bands identified; nest must be around Li 21 |

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| | Whatitiri track | Finding Robins at beginning of Lh and Lg | - | - | - | - | No Robins found |
| 18.09.2008 | Private property at Bethless Beach | Searching for group of Robins seen earlier by owner of property | - | - | - | - | No Robins found; Habitat would have been suitable for Robins |
| | ACW | Searching for nest | GB-OM | GR-OM | Left site of shortcut to ACW, few meters from the stream; top of Ponga tree; Height: 3.5m | ♀ sitting on the nest; got called off the nest and fed by ♂ | **2nd nest of the breeding season** |
| 19.09.2008 | ACW | Nest monitoring | GB-OM | GR-OM | See above | See above | |
| | Whatitiri track | Finding Robins | - | - | - | - | No Robins found at end of Le |
| | Whatitiri track | Searching for nest at bait line Li | O?-RM | BY-OM | - | - | Nest must be close to big fern trees at Li21; ♀ showed defensive behaviour |
| 20.09.2008 | Whatitiri track | Searching for nest at bait line Li | OG-RM | BY-OM | In a big fern tree, on dead branches; Height: 1.80m | Female showing defensive behaviour; **2 eggs** in the nest –> used the mirror | **3rd nest of the breeding season** |
| **Week 4** | | | | | | | |
| 22.09.2008 | ACW | Nest monitoring | GB-OM | GR-OM | See 19.09.2008 | Mature birds still feeding themselves; No sign of chicks yet | No Robins found at the rest of ACW; No sign of T17 ♀ R-M |

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| | Line BB | Searching for Robins | - | - | - | - | No Robins found |
| 23.09.2008 | ACW | Nest monitoring | GB-OM | GR-OM | See 19.09.2008 | See above | - |
| | Lower Kauri track | Searching Robins @ small stream | - | - | - | - | No Robins found |
| | Whatitiri track | Nest monitoring | OG-RM | BY-OM | See 20.09.2008 | See 20.09.2008 | - |
| 24.09.2008 | Anderson Track | Nest monitoring | BW-OM | B-M | See 16.09.2008 | **Two chicks** in nest with black feathers- mirror | Mature robins not flying back to nest; Feeding themselves |
| | ACW | Nest monitoring | GB-OM | GR-OM | See 19.09.2008 | **2 eggs** in the nest -> used mirror enlarged by stick | ♀flying back to nest and showing defensive behaviour; ♂ did not appear |
| 25.09.2008 | Robinson Ridge track | Searching for nest at R13 | BW-RM | WW-RM | Nest in Nikau palm; Height: 3.5m | **2 eggs** in the nest-> climbing up a tree, using long mirror | **4th nest of the breeding season** |
| 26.09.2008 | Anderson track | Searching for Robins | - | - | - | - | No Robins found on stoat line and AN2 |
| 28.09.2008 | Anderson track | Banding chicks | BW-OM | B-M | See 16.09.2008 | Chicks got eyes closed, covered by some feathers; Good status of health | Chicks got bands: **GG-OM** and **GY-OM**; sex= unknown |
| **Week 5** | | | | | | | |
| 30.09.2008 | ACW | Searching for Robins | GB-OM | - | See 19.09.2008 | ♀off the nest; feeding herself and storing worms | No sign of ♀ R-M between T17& T19 |
| | Whatitiri track | Searching for Robins | - | - | - | - | No Robins found at 5.5 and rest of track |

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| | Whatitiri track | Nest monitoring | OG-RM | BY-OM | See 20.09.2008 | **1 chick** and 1 egg! Chick = 1 day old! | ♀ sitting on nest, called off and fed by ♂ |
| 01.10.2008 | Anderson track | Nest monitoring | BW-OM | B-M | See 16.09.2008 | Both chicks still in the nest | Chicks get fed mainly by ♂ |
| | Anderson track | Searching for Robins | - | - | - | - | No Robins found at bait line AN 2 |
| 02.10.2008 | B-block lines | Searching for Robins | - | - | - | - | No Robins found at BA |
| | Whatitiri track | Searching for Robins | - | - | - | - | No Robins found at Ld |
| | Watitiri track | Searching for Robins | - | - | - | - | No Robins found at 5.5 |
| 04.10.2008 | ACW | Nest monitoring | GB-OM | GR-OM | See 19.09.2008 | **Nest failed!** Still two eggs in nest but ♀ is not coming back to nest; ♀ building a new nest in a different tree, same territory | This pair might be infertile; Similar to the unbanded pair of the last breeding season (same pair?); ♂ is feeding the ♀ |
| | Cascade track | Searching for Robins | - | - | - | - | No Robins found on whole track |
| **Week 6** | | | | | | | |
| 06.10.2008 | Whatitiri track | Nest monitoring | OG-RM | BY-OM | See 20.09.2008 | Still one chick and one egg | ♂ is feeding the ♀; ♀is not feeding the chicks but went back to the nest; |

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| | Pukematekeo track | Searching for Robins | - | - | - | - | No Robins found between AN10 and AN11 |
| 07.10.2008 | ACW | Nest monitoring | GB-OM | - | **New nest** on top of an epiphyte at height of approximately 3 meters | ♀close to nest but no nest building or incubation activities | **5th nest of the breeding season**; ♂ did not appear |
| | Anderson track | Nest monitoring | BW-OM | B-M | See 16.09.2008 | ♀ and ♂ bringing worms to the chicks | - |
| 08.10.2008 | Anderson track | Nest monitoring/ Searching for Robins | BW-OM | B-M | See 16.09.2008 | ♀ and ♂ bringing worms to the chicks | No Robins at opposite site of the road to Anderson track |
| | ACW | Nest monitoring | GB-OM | GR-OM | See 07.10.2008 | ♀close to nest but no nest building or incubation activities | ♂ did not appear; ♀ did not eat or store all of the mealworms |
| 09.10.2008 | Whatitiri track | Nest monitoring | OG-RM | BY-OM | See 20.09.2008 | ♀ sitting on the chick, not feeding it | ♂ feeding and calling ♀ off the nest |
| | Track out of predator controlled Ark in the Park area / Wainamu bush track | Searching for Robins | - | - | - | - | No Robins found at stream where one has been seen in the past |
| 10.10.2008 | Robinson Ridge track | Searching for Robins | - | - | - | - | No Robins found at F3, F5 and F6 |
| **Week 7** | | | | | | | |
| 13.10.2008 | Whatitiri track | Banding chick | OG-RM | BY-OM | See 20.09.2008 | Chick 14 days old; still in nest; eyes open | Chick has got band combination **GO- OM** |

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| | ACW | Nest monitoring/ Searching for Robins | GB-OM | GR-OM | See 07.10.2008 | ♀ sitting on nest; fed by ♂ | No sign of ♀ Robin at T 17 |
| 14.10.2008 | Pukematekeo track | Searching for Robins | - | - | - | - | No Robins found |
| | Upper kauri track | Searching for Robins | - | - | - | - | No Robins found |
| 15.10.2008 | Anderson track | Nest monitoring | BW-OM | B-M | See 16.09.2008 | Fledglings left the nest | ♀ and ♂ collecting worms |
| | Pukematekeo track | Searching for Robins | - | - | - | - | No Robins found |
| | ACW | Nest monitoring | GB-OM | GR-OM | See 07.10.2008 | ♀ sitting on nest; fed by ♂ | - |
| 16.10.2008 | Anderson track | Finding Fledglings | BW-OM | B-M | - | - | No fledglings found; ♀ and ♂ flying off with worms |
| | Anderson track | Searching for Robins | - | - | - | - | No Robins found at AN1 |
| | Hihi knoll | Monitoring Hihi nest | | | | | Male Stitch birds chasing each other; one dominant male |
| 17.10.2008 | Robinson Ridge track | Nest monitoring | BW-RM | WW-RM | New nest on top of Rata; height circa 5 meters | **Nest failed!** Old nest empty; no sign of fledglings and eggs; **predation**?! ♀ sitting on **new** nest; fed by ♂ | **6th nest of the breeding season** |
| | Whatitiri track | Sightings of other volunteers | OG-RM | BY-OM | See 20.09.2008 | ♀ feeding fledgling GO- OM | Fledgling left the nest |

| **Week 8** | | | | | | | |
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| 20.10.2008 | Whatitiri track | Finding fledgling | OG-RM | BY-OM | - | ♀ feeding fledgling | ♂ stores worms far away from ♀ |
| | ACW | Nest monitoring | GB-OM | GR-OM | See 07.10.2008 | ♀ sitting on nest; fed by ♂ | - |
| | Anderson track | Monitoring Hihi nest | HM- OW | - | Nest in whole of Rewa rewa branch | ♀ leaving nest every 6 minutes | No sign of ♂ |
| 21.10.2008 | Anderson track | Finding fledglings | BW-OM | B-M | - | ♀ serious **breathing problems**; wings look messed up; eating worms | ♂ feeding fledglings (GG-OM & GY-OM); fledglings in good condition |
| | ACW | Nest monitoring | GB-OM | - | See 07.10.2008 | ♀ sitting on nest; ♂ singing in distance | **Three eggs** in nest; used ladder & mirror |
| 22.10.2008 | Anderson track | Finding fledglings | BW-OM | B-M | - | ♀ still looks ill; not feeding fledglings; chasing them away | ♂ feeding fledglings (GG-OM & GY-OM) |
| | Whatitiri track | Finding fledgling | OG-RM | BY-OM | - | ♀ and ♂ cashing worms | No sign of fledgling; no courtship behaviour |
| | Anderson track | Monitoring Hihi nest | HM-OW | YY-JM | See 20.10.2008 | Both ♀ and ♂ in and out of nest regularly | Tui tried to get into the nest three times, got chased away by ♂ |
| | Anderson track | Setting up three cat traps | BW-OM | - | - | - | ♀ looks better than in the morning; Traps at TB, TA and |

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| | | | | | | | in between the two lines |
| 23.10.2008 | Whatitiri track | Finding fledgling | OG-RM | BY-OM | - | ♀ and ♂ caching worms | No sign of fledgling |
| | Anderson track | Checking on BW-OM | BW-OM | B-M | - | Fledglings got fed by♂ | ♀ still breathing problems but feeding well |
| | Private property | Searching for Robins that have been heard | - | - | - | - | No Robins found |
| 24.10.2008 | Piha, bush near road | Searching for Robins | BR-RM | - | - | - | Feale fro first breeding season after translocation, flew all the way from Cascades to Piha |
| | Anderson track | Checking on BW-OM | BW-OM | B-M | - | - | ♀ still breathing problems; fledglings get feed by ♂ |
| 25.10.2008 | Anderson track | Checking on BW-OM | BW-OM | - | - | - | Feeding on worms, caching the rest; beak less open than day before |
| 26.10.2008 | Anderson track | Checking on BW-OM | BW-OM | - | - | - | ♂ singing in background; feathers of ♀ look messed up and wet; beak open again |
| **Week 9** | | | | | | | |
| 27.10.2008 | ACW | Nest monitoring | GB-OM | - | See 07.10.2008 | ♀sitting on nest, getting off to eat and cache worms | No sign of ♂ GR-OM |

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| | Anderson track | Checking on BW-OM Searching for fledglings | BW-OM | - | - | no sign of ♂ B-M and fledglings | ♀ in a better condition than yesterday, beak still wide open; |
| 28.10.2008 | Anderson track | Checking on BW-OM Searching for fledglings | - | B-M | - | No sign of BW-OM | Fledglings get fed by ♂ |
| | ACW | Nest monitoring | GB-OM | GR-OM | See 07.10.2008 | ♀ sitting on nest; fed by ♂ | - |
| | Whatitiri track | Finding fledgling Monitoring breeding status | OG-RM | BY-OM | - | No sign of fledgling GO-OM | ♂ calling for ♀ but not feeding her; ♀ eating a lot of worms |
| 30.10.2008 | Robinson Ridge track | Nest monitoring | BW-RM | WW-RM | See 17.10.2008 | ♀ on nest | ♂ calling her off the nest & feeding her |
| | Whatitiri track | Finding fledgling; Monitoring breeding status | OG-RM | BY-OM | nest in tree fork, height 3.5 meters | ♀ sitting on new nest | **7th nest of the breeding season**; Fledgling GO-OM fed by ♂; chased away by ♀ |
| 31.10.2008 | Whatitiri track | Nest monitoring | OG-RM | BY-OM | See 30.10.2008 | ♀ sitting on new nest | ♀ not getting fed by ♂,♂ feeding GO-OM |
| | ACW | Nest monitoring | GB-OM | GR-OM | See 07.10.2008 | ♀ not on nest; no worms taken into the nest either | ♂ feeding ♀; 24th day on nest; ♂ stores worms on opposite site of nest |
| | Anderson track | Checking on BW-OM Searching for fledglings | - | B-M | - | No sign of BW-OM | Fledglings get fed by ♂ |
| 01.11.2008 | Whatitiri track | Nest marking | OG-RM | BY-OM | See 30.10.2008 | ♀ sitting on | Fledgling GO-OM |

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| | | | | | | nest | fed by ♂; chased away from nest by ♀ |
| **Week 10** | | | | | | | |
| 10.11.2008 | ACW | Finding T17 (♀) | - | - | - | - | No sign of Robin |
| | Anderson track | Finding fledglings | - | B-M | - | No sign of BW-OM | ♂ feeding GG-OM & YG-OM |
| | Whatitiri track | Nest monitoring | OG-RM | BY-OM | See 30.10.2008 | ♀ sitting on new nest | - |
| 11.11.2008 | ACW | Nest monitoring | GB-OM | GR-OM | See 07.10.2008 | ♀ not on nest | ♂ only stayed two minutes |
| | Whatitiri track | Searching for Robins at L3 (old territory of Robins) | - | - | - | - | No Robins found |
| | Bush at U3 | Searching for Robins | - | - | - | - | No Robins found |
| | Bait line ML 1.5 | Searching for Robins | - | - | - | - | No Robins found |
| | Bait line L1 | Searching for Robins | - | - | - | - | No Robins found |
| 12.11.2008 | Robinson Ridge track | Nest monitoring | BW-RM | WW-RM | See 17.10.2008 | ♀ and ♂ feeding chicks | Two chicks seen in nest |
| | ACW | Egg removal | GB-OM | - | See 07.10.2008 | Eggs cold, ♂ not on nest | **Nest failed!** (2nd nest of this pair) |
| | Anderson Track | Finding fledglings | - | B-M | - | Both fledglings taking worms from us directly | ♂ feeding fledglings additionally |
| 13.11.2008 | Whatitiri track | Searching for Robins @ beginning L4 | - | - | - | - | No Robins found |
| | Whatitiri track | Searching for Robins @ bait line L3 | - | - | - | - | No Robins found |
| | Upper Kauri track | Searching for Robins @ stream near C1 | - | - | - | - | No Robins found |
| | Anderson track | Searching for Robins @ bait line AN2 | - | - | - | - | No Robins found |

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| 14.11.2008 | Whatitiri track | Nest monitoring | OG-RM | BY-OM | See 30.10.2008 | ♀ and feeding chicks | Three chicks in the nest |
| | ACW | Monitoring breeding status | GB-OM | - | - | - | Only♀ appeared; no nest building activities |
| **Week 11** | | | | | | | |
| 17.11.2008 | Anderson track | Finding fledglings | - | - | - | - | Only fledgling GG-OM appeared, taking worms |
| 18.11.2008 | Whatitiri track | Nest monitoring | OG-RM | BY-OM | See 30.10.2008 | ♀ and ♂ feeding chicks | - |
| | Anderson track | Searching for Robins at bait line TA | - | - | - | - | No Robins found |
| | Tramline track | Searching for Robins | - | - | - | - | No Robins found |
| | Anderson track | Finding fledglings | - | B-M | - | - | ♂ feeding GG-OM |
| 19.11.2008 | Anderson track | Finding fledglings | - | B-M | - | - | ♂ feeding YG-OM |
| | ACW | Monitoring breeding status | GB-OM | - | - | - | No sign of ♂ |
| | ACW | Searching for Robin atT17 | - | - | - | - | No sign of ♀ Robin at T 17 |
| 20.11.2008 | Whatitiri track | Banding chicks | OG-RM | BY-OM | See 30.10.2008 | Chicks approximately 10 days old, eyes closed | Chicks have got band combination: **WR-OM** **WB-OM** **WW-OM** |
| | Anderson track | Searching for Robins at stream until T8 | - | - | - | - | No Robins found |
| 21.11.2008 | Robinson Ridge track | Finding fledglings | BW-RM | WW-RM | See 17.10.2008 | No chicks in nest left | No sign of fledglings but ♀ and ♂ are taking worms away |

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| | Whatitiri track | Nest monitoring | OG-RM | BY-OM | See 30.10.2008 | ♀ and ♂ feeding chicks | - |
| **Week 12** | | | | | | | |
| 24.11.2008 | ACW | Monitoring breeding status | GB-OM | - | - | - | ♂ last appeared on 11.11.2008 ; No sign of breeding activity |
| | Upper Kauri track | Searching for Robins at L9 | - | - | - | - | No Robins found |
| | | Searching for Robins at L6 | - | - | - | - | No Robins found |
| 25.11.2008 | Anderson track | Finding fledglings | - | B-M | - | - | Fledgling GY-OM around, not fed by ♂ |
| | Whatitiri track | Finding fledglings | OG-RM | BY-OM | - | - | Parents feeding fledglings |
| 26.11.2008 | Anderson track | Finding fledglings | - | B-M | - | - | Only ♂ appeared |
| | Whatitiri track | Searching for Robins | - | - | - | - | No Robins along stream to Golf course |
| | Whatitiri track | Searching for Robins | - | - | - | - | No Robins at bush between L4 and L5 |
| 27.11.2008 | Robinson Ridge track | Finding fledglings | BW-RM | WW-RM | - | - | Only♂ and ♀ appeared |
| 28.11.2008 | Bush at Golf course | Searching for Robins | - | - | - | - | No Robins along stream in bush |
| **Week 13** | | | | | | | |
| 02.12.2008 | Whatitiri track | Finding fledglings | OG-RM | BY-OM | - | - | Parents feeding fledglings; two fledglings seen |
| | Anderson track | Finding fledglings | - | - | - | - | No Robin appeared |

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| 03.12.2008 | Whatitiri track | Finding fledglings | OG-RM | BY-OM | - | - | Parents feeding fledglings |
| | Anderson track | Finding fledglings | - | B-M | - | - | B-M feeding GY-OM; no sign of GG-MM |
| 04.12.2008 | ACW | Monitoring breeding status | GB-OM | - | - | - | No breeding activities; no sign of GR-OM |
| | Lower kauri track | Searching for Robins | - | - | - | - | No Robins at bait line Ld |
| 05.12.2008 | Robinson Ridge track | Finding fledglings | BW-RM | WW-RM | - | - | Minimal two (max. three) fledglings seen |
| **Week 14** | | | | | | | |
| 08.12.2008 | Whatitiri track | Searching for Robins | - | - | - | - | No Robins at stream up to Lg |
| | Whatitiri track | Finding fledglings | OG-RM | BY-OM | - | - | ♂and ♀taking worms to fledglings |
| 09.12.2008 | ÂCW | Finding RG-OM | GB-OM | - | - | - | No sign of ♂ GR-OM |
| 10.12.2008 | Anderson track | Finding fledglings | - | B-M | - | - | No fledglings; ♂ no significant interest in worms |
| | Whatitiri track | Finding fledglings | OG-RM | BY-OM | - | - | Parents feeding fledglings (two fledgl. seen) |
| | | Searching for Robins | - | - | - | - | No Robins found at bait line L 5.5 |
| 11.12.2008 | Robinson Ridge track | Finding fledglings | BW-RM | WW-RM | - | - | Fledglings heard but not seen; ♀ only feeding herself |
| 12.12.2008 | ACW | Monitoring breeding status | GB-OM | - | - | - | No breeding activities; no sign of |

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| | | | | | | | GR-OM |
| | Anderson track | Monitoring single ♂ | - | B-M | - | - | Taking worms, singing a lot |
| **Week 15** | | | | | | | |
| 15.12.2008 | Anderson track | Monitoring single ♂ | - | B-M | - | - | Singing constantly |
| | Anderson track | Searching for Robins | - | - | - | - | No Robins found at bait line AN2 |
| | ACW | Monitoring breeding status | GB-OM | - | - | - | No breeding activities; no sign of GR-OM |
| 16.12.2008 | Whatitiri track | Finding fledglings | OG-RM | BY-OM | - | - | Parents feeding fledglings (two fledgl. seen) |
| 18.12.2008 | Robinson Ridge | Finding fledglings and monitoring breeding status | BW-RM | WW-RM | **New nest** in top of fern tree | **Three eggs** in nest | **8th nest of the breeding season;** ♀ incubating and fed by ♂ |
| 19.12.2008 | Anderson track | Monitoring single ♂ | - | B-M | - | - | Singing constantly |
| 20.12.2008 | Anderson track | Searching for Robins | - | - | - | - | No Robins at Hihi feeder 1 |
| **Week 16** | | | | | | | |
| 22.12.2008 | ACW | Monitoring breeding status | GB-OM | - | - | - | No breeding activities; no sign of GR-OM |
| 23.12.2008 | Whatitiri track | Finding fledglings | OG-RM | BY-OM | - | - | Parents feeding fledglings |
| | Anderson track | Monitoring single ♂ | - | B-M | - | - | Only singing not interested in worms |
| 25.12.2008 | Anderson track | Searching for Robins | - | - | - | - | No Robins at and around Hihi feeder 1 |
| 26.12.2008 | Fairy Falls track | Searching for Robins | - | - | - | - | No Robins found |
| **Week 17** | | | | | | | |

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| 29.12.2008 | Anderson track | Monitoring single ♂ | - | B-M | - | - | Singing constantly |
| | ACW | Monitoring single ♀ | GB-OM | - | - | - | Taking worms; no ♂ around |
| 30.12.2008 | Robinson Ridge track | Nest monitoring | BW-RM | WW-RM | See 18.12.2008 | ♀ not incubating | ♀ off the nest more than 20 minutes |
| | Whatitiri track | Finding fledglings | OG-RM | BY-OM | - | - | Parents feeding fledglings |
| 31.12.2008 | Anderson track | Searching for Robins | - | - | - | - | No Robins at AN 11 |
| 03.01.2009 | Bait line K 5 | Searching for Robins and putting up bait stations | - | - | - | - | No Robins found |
| **Week 18** | | | | | | | |
| 05.01.2009 | Wainamu bush track | Searching for Robins | YG-OM | Unbanded | - | - | **New pair** of Robins found; no nest building activity; no obvious incubation behaviour |
| 06.01.2009 | Whatitiri track | Searching for nest | OG-RM | - | **New nest** in tree fork | **Three eggs** in nest | **9th nest of the breeding season;** no sign of BY-OM; fledgling WR-OM around nesting site-chased away by incubating ♀ |
| 07.01.2009 | Anderson track | Monitoring single ♂ | - | B-M | - | - | Singing constantly |
| | Fenceline track | Searching for Robins | - | - | - | - | No Robins found |
| 08.01.2009 | Lake Wainamu | Searching for Robins | - | - | - | - | No Robins found |
| | ACW | Monitoring single ♀ | - | - | - | - | No ♀ found |

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| 09.01.2009 | Wainamu bush track | Monitoring Robins | YG-OM | Unbanded | - | - | No nesting activity but courtship behaviour |
| | Robinson ridge track | Nest monitoring | - | WW-RM | See 18.12.2008 | ♀ not incubating | ♀ absent; **Nest failed!** |
| 11.01.2009 | Whatitiri track | Re-baiting bait stations Lf, Lg, Lh, Li | - | - | - | ♀ at Li is incubating | No sign of BY-OM |
| **Week 19** | | | | | | | |
| 12.01.2009 | Anderson track | Monitoring single ♂ | BW-RM | B-M | - | - | ♀ from R13 back with B-M (like last breeding season) |
| | ACW | Monitoring single ♀ | - | - | - | - | No ♀ found |
| 13.01.2009 | Anderson track | Monitoring breeding status | BW-RM | B-M | **New nest** on top of fern tree | ♀ incubating | **10th nest of the breeding season** |
| 14.01.2009 | Anderson track | Nest monitoring | BW-RM | B-M | See 13.01.2009 | ♀ incubating | - |
| | Bait line K5 | Searching for Robins | - | - | - | - | No Robins found |
| 15.01.2009 | Whatitiri track | Nets monitoring | OG-RM | - | See 06.01.2009 | ♀ incubating (1 egg, 2 chicks) | No sign of BY-OM (♂) |
| | Whatitiri track | Searching for Robins | - | WB-OM | - | - | Fledgling from Li in new territory at L5.5 |
| **Week 20** | | | | | | | |
| 19.01.2009 | Stoat line | Searching for Robins | - | - | - | - | - |
| | Bait line K5 | Searching for Robins | - | - | - | - | No robins on line and at stream found |
| | Anderson track | Nest monitoring | BW-RM | - | - | ♀ incubating | No sign of B-M (♂) |
| | Bait line K11 | Searching for Robins | - | - | - | - | No Robins found |
| 20.01.2009 | Whatitiri track | Monitoring single ♂ | - | WB-OM | - | - | ♂ Singing, no sign of partner |
| | Whatitiri track | Nest monitoring | OG-RM | - | See 06.01.2009 | ♀ incubating | No sign of BY-OM |

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| | | | | | | (3 chicks - 4 days old) | (♂) |
| 21.01.2009 | Anderson track | Nest monitoring | BW-RM | B-M | See 13.01.2009 | ♀ incubating | ♂ feeding ♀ and **unbanded Robin** |
| | Whatitiri track | Nest monitoring | OG-RM | - | See 06.01.2009 | ♀ feeding chicks | No sign of BY-OM (♂) |
| | Whatitiri track | Monitoring single ♂ | - | - | - | - | Bird not found |
| 22.01.2009 | Anderson track | Banding unbanded fledgling | BW-RM | B-M | - | - | Band combination: **WG-OM** |
| | Anderson track | Nest monitoring | BW-RM | B-M | See 13.01.2009 | ♀ incubating | **Two eggs** in nest |
| | Wainamu bush track | Monitoring Robins | YG-OM | - | - | - | No nesting activity, no sign of ♂ |
| 23.01.2009 | Anderson track | Monitoring Robins | - | B-M | - | - | GW-OM chased away by B-M |
| | Whatitiri track | Nest monitoring | OG-RM | - | See 06.01.2009 | ♀ feeding chicks | No sign of BY-OM (♂) |
| **Week 21** | | | | | | | |
| 26.01.2009 | Whatitiri track | Monitoring single ♂ | - | WB-OM | - | - | Still in new territory, on sign of partner |
| | Whatitiri tack | Banding chicks | OG-RM | - | See 06.01.2009 | ♀ feeding chicks after banding | Chicks have got band combination: **WY-OM** **WO-OM** **GW-OM** |
| 27.01.2009 | Whatitiri track | Nest monitoring | OG-RM | - | See 06.01.2009 | ♀ feeding chicks | No sign of BY-OM (♂) |
| | ACW | Monitoring Robins | - | - | - | - | ♀ GB-OM not around |
| 28.01.2009 Skink survey | - | - | - | - | - | - | - |
| 29.01.2009 | Lower Kauri track (L6) | Monitoring single ♀ | - | - | - | - | No single ♀ found |

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|---|---|---|---|---|---|---|---|
| | Bait line T17 | Searching for Robins | - | - | - | - | No Robins found |
| 30.01. 2009 | Anderson track | Monitoring Robins | BW-RM | B-M | See 13.01.2009 | ♀ incubating | Fledgling WG-OM not around |
| | Private property | Searching for Robin | GO-OM | - | - | - | GO-OM is a ♀, no sign of partner |